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UNITED STATES PATENT OFFICE.

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COMPOSITE ROLL.

Application filed March 30, 1923. Serial No. 628,801.

This invention relates to composite rolls. More particularly it relates to composite rolls having removable forming segments adapted to produce shapes of varying cross section at different points of their length.

The objects of the invention are to provide a composite roll structure in which the forming segments may be securely clamped upon the roll body and held readily in position, in which a forming groove may be made in the outer surface of individual segments or between meeting edges of cooperating pairs of segments, and these segments arranged in a variety of different combinations, whereby to roll a variety of shapes, by merely substituting differently grooved segments. Another object is to provide a structure wherein two different forms of aligned grooves may be used, with a smooth and regular transition between the grooves, this transition being formed by removable segments. Another object is to provide means for clamping the removable parts together upon the roll body in such manner that the clamping device may be readily released when it is desired to disassemble the roll, and securely held in place while the roll is in operation.

Another object is to roll at one continuous operation in continuous series a plurality of shapes having two or more different cross sections. Another object is to roll bars having circular ends and an elliptical or flattened body between. Other objects and advantages will appear from the following specification.

Referring to the drawings, Fig. 1 is a side elevation of a composite roll adapted to form bars having an elliptical body portion with circular ends, and illustrating the means of changing the groove over from one shape to the other by means of transition segments; Fig. 2 is an axial section through the roll of Fig. 1, showing a single series of aligned segments forming a groove at the left, and parallel cooperating series forming a groove at the right; Fig. 3 shows the bar having round ends and a flattened body as formed by the rolls of Figs. 1 and 2; Fig. 4 is a cross section through a pair of cooperating rolls, such as those illustrated in Figs. 1 and 2, showing the formation of a bar similar to that illustrated in Fig. 3; Figs. 5 and 6 are sections of the bar upon the lines V—V and VI—VI, respectively; Fig. 7 shows a pair of rolls adapted to form cold chisels or punches, such as illustrated in Fig. 8; Fig. 9 shows rolls adapted to form crowbars, such as illustrated in Fig. 10.

In my prior Patent No. 1,289,602, I have illustrated and described a composite roll similar in many respects to that herein described, and have claimed certain features thereof. The present application claims certain additional features, divisible from those claimed in the said patent, and modifications of the structure not therein described.

Prior to my invention it was not, so far as I am aware, practical to roll at one operation bars having a round portion and an elliptical or flattened portion. Where it was desired to have such a structure, as for example in the formation of concrete reinforcing bars, etc., or of tie rods for street railways, which rods are ordinarily made with round ends adapted to be inserted through the web of the rails, and to be threaded to receive locking nuts, and having a flattened or elliptical body portion between the circular ends, it was the prior practice to roll such bars as rounds, and then to put them through a second rolling operation which flattened the middle portions. By the construction described and illustrated in this application, based upon my prior composite roll construction, I am enabled to roll such shapes continuously from a blank, in finished form, ready to be cut into lengths and threaded. Articles having a similar structure have been rolled by the use of my invention in large quantity for use as the braces of aeroplanes, the intermediate portion of these braces being elliptical, or stream-line, to afford minimum resistance to air pressure, the ends being round so as to take threads for locking nuts. Likewise, by the use of this invention I have been able to roll automobile axles, crow-bars, chisels and such articles having varying cross sections. All of this will be plain from a consideration of the specification and drawings.

The construction comprises a roll body 1 having the usual necks 2 and wobblers 3 for fitting into a roll housing and driving mechanism. At one end of the roll body there is provided an abutment 4, the inner edge of which is undercut, forming a beveled collar as clearly illustrated in Fig. 2. The other end of the roll has threads 6, adapted to be engaged by an interiorly

threaded nut 7, which is surrounded by a brake band 8, which may be tightened by a hand wheel 9. By this construction when the roll is in its housing, by tightening the brake on the nut 7, it may be readily turned down by rotation of the roll into the position illustrated in Figs. 1 and 2, and so used to clamp the movable members described below in position upon the roll.

Cooperating with the fixed undercut collar 5 are undercut slidable rings 10, 11 and 12, adapted to slip on the roll body before the nut 7 is positioned. The ring 10 has its undercut beveled face opposite to that of the collar 5, and the rings 11 and 12 have their faces opposite as clearly shown in Fig. 2. A series of segments 13 are positioned end to end around the roll body and seated thereon and their outer beveled faces 14 and 15 are engaged by the undercut collar 5 and the slidable ring 10, all as clearly illustrated at the left of Fig. 2. At the right of that figure, two series of cooperating segments 16 and 17 are shown, positioned side by side with a groove 18 formed at their meeting edges, and these segments are overhung and clamped against the roll body by the rings 11 and 12, as illustrated. A ring of metal 19 of a comparatively high coefficient of expansion is positioned between the rings 10 and 11. The function of this ring is to expand to a greater extent than the other metal of the members described so as to take up any looseness that might develop by reason of expansion due to heat of the various parts when the roll is in use.

A plurality of screws 20 extend through the nut 7 parallel to the axis of the roll. These screws have an exterior non-circular head, and their inner end bears against the ring 12. When the roll is assembled, the segments 13, 16 and 17 having been placed in position and being engaged by the rings and collar above described, the locking nut 7 is turned down on the roll body until all of the segments and rings are driven against the abutment 4. Holding of the members 7 with the brake mechanism described and the driving of the rolls by the ordinary driving mechanism will secure and firmly clamp all of the parts together and hold them in rigid position during the rolling operation. Due to the large surface contact of the member 7 and ring 12, when this method of tightening is used it is sometimes difficult to release the ring 7 when it is desired to disassemble the composite roll. This is especially true when the roll is hot, and the members have all been additionally tightened by expansion of the ring 19. Consequently, I prefer to run the locking member 7 down to an initial clamping position, and then to make the final tightening by the screws 20. They act as set screws to hold the member 7 in place regardless of vibration in use, and they secure a uniform take up by permitting individual adjustment. They bear upon the ring 12 at a number of points, and therefore drive the segments and rings together uniformly. Owing to their comparatively small surface contact with the ring 12 it is very easy to tighten them up, and release them with an ordinary wrench, and by this construction I avoid the serious difficulty of sticking sometimes experienced where the member 7 is used to secure the final clamping action.

It will be observed that the segments 13 as illustrated at the top of Fig. 1 have a semi-circular groove 21 therein, while at the lower part of the roll the segments 13^a have an elliptical or flattened groove 21^a. The intermediate segment 13^b, which I call a transition segment, has a groove 21^b that is elliptical at its lower end, so as to register with the groove 21^a of the segments 13^a, and at its upper end, the groove is semi-circular, to register with groove 21. The groove in segment 13^b, between its ends, merges uniformly from the semi-circular to elliptical form, and thus produces a smooth transition between the two different forms of groove.

The cooperating pairs of segments 16 and 17 at the right of the roll form an exactly similar groove and transition portion, the difference being that in this latter form two segments are clamped together to make a groove between, instead of having the groove formed in the face of a single segment, as at the left. The transition segments are marked 16^b and 17^b, forming a transition groove 18^b, and the segments forming the elliptical portion 18^a of the groove are marked 16^a and 17^a respectively. The grooves are so proportioned in the different forms of segments that the bar formed therein is of substantially equal cross-sectional area at all points.

By this construction, I can roll a bar having a length equivalent to the circumference of the roll, and can make any portion 23 of that length semi-circular, and the remaining portion 24 flattened or elliptical, with a smooth transition portion 25 between, of equal strength and area on any cross-section, by simply varying the relative number of segments 13 and 13^a. As illustrated in Fig. 4 a continuous blank may be fed into the rolls and a number of the bars illustrated in Fig. 3 are produced, the individual bars there illustrated being secured by cutting through the middle portion of the round parts of the rolled product.

In Fig. 7 I have illustrated special segments 26, having grooves 27 therein adapted to form an octagonal body 28 of a chisel, and joining segments 29 adapted to form the cutting head 30 of the chisel, while still another shape of segment 31, forms the end

32 of the chisel, and the transition from it to the head 30 of the succeeding one.

In Fig. 9 there is illustrated an arrangement comprising segments adapted to form a crow-bar having a head 33, a circular or square portion 34, a hexagonal or octagonal portion 35, and a beaded handle terminal portion 36.

The articles illustrated in Figs. 7 to 10 inclusive illustrate the variety of shapes that may be formed by the use of my composite roll with segments comprising grooves of different shape, and with transition segments adapted to merge from one form of groove into another.

The advantage of being able to substitute segments of different shapes and to make up different combinations of shaped segments upon the same roll body, by merely substituting segments, is a decided advance in this art and has rendered possible the rolling of shapes which were formerly necessarily forged.

It will be understood that no attempt has been made to have the drawings show the various parts in correct scale or relative proportions. For example the roll bodies 1 and 1^a are illustrated as very small compared to the product rolled. This is done to permit a clear illustration of the arrangement of parts. In practice the roll body would be many times larger than here illustrated, comparative to the other parts, and other proportions also materially different.

It is also to be understood that the segmental facing members may be made much longer relative to the circumference of the roll than as here shown. The number and size will vary with the particular product to be rolled.

I claim:

1. A composite roll comprising a spindle having a fixed undercut collar at one end, segmental facing members arranged end to end around and retained against the spindle by said collar and by a slidable undercut ring adapted to engage the facing members, said facing members having a forming groove in their outer faces, the groove so formed being of different contour in different segments, and means to drive the undercut ring towards the collar whereby to clamp the segments upon the spindle.

2. A composite roll comprising a spindle, segmental facing members arranged end to end around the roll and seated on the spindle, said facing members having a forming groove in their outer faces, the grooves so formed being of different contour in different segments, and means to clamp the segments upon the spindle.

In testimony whereof, I sign my name.

GEORGE BAEHR.

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Fig. 1.

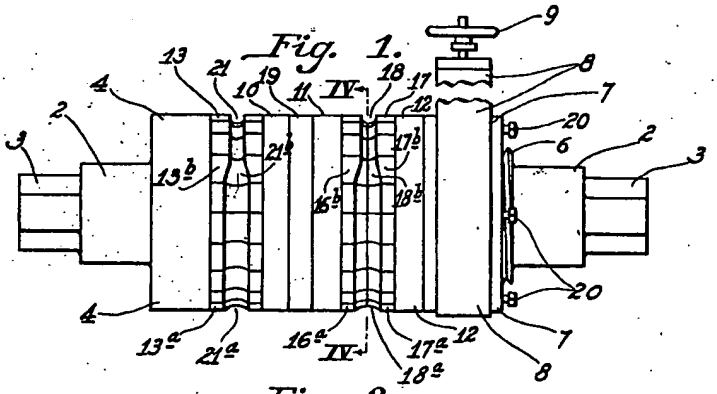

Fig. 2.

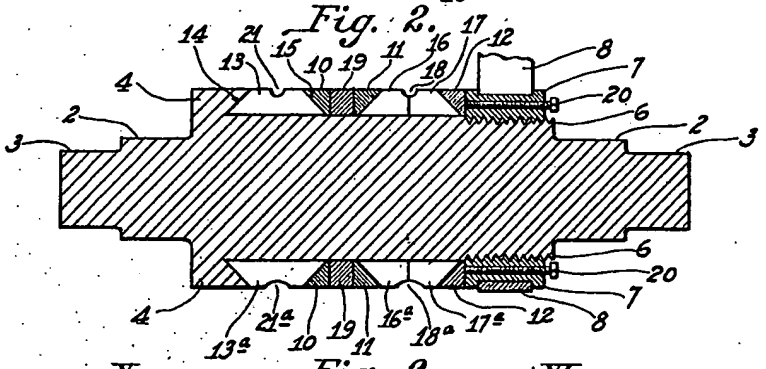

Fig. 3.

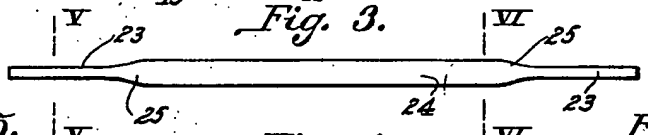

Fig. 5.

Fig. 4

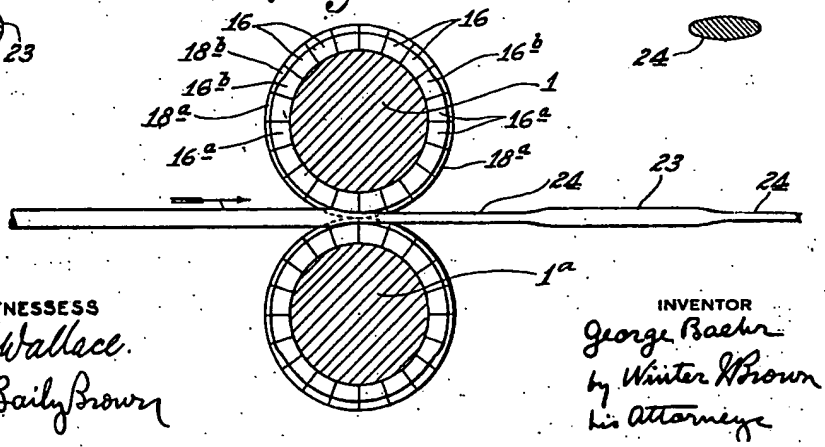

Fig. 6.

WITNESSESS

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Fig. 7.

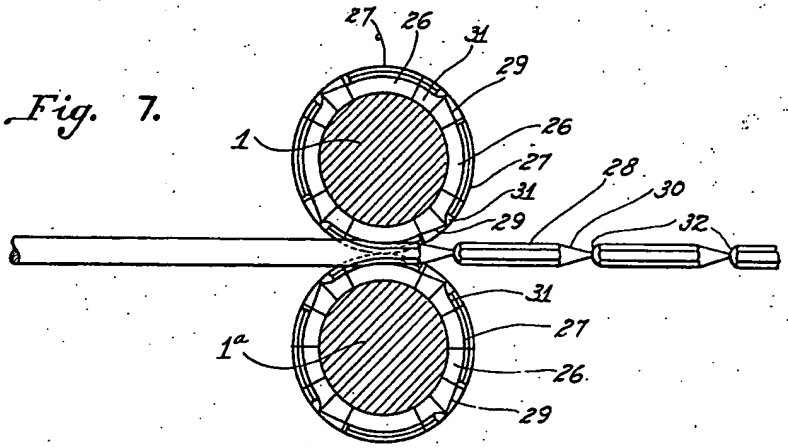


Fig. 8.

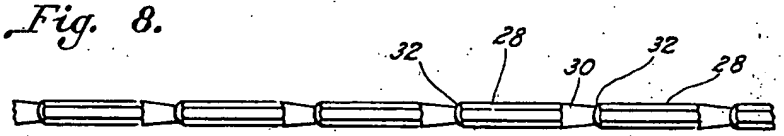


Fig. 9.

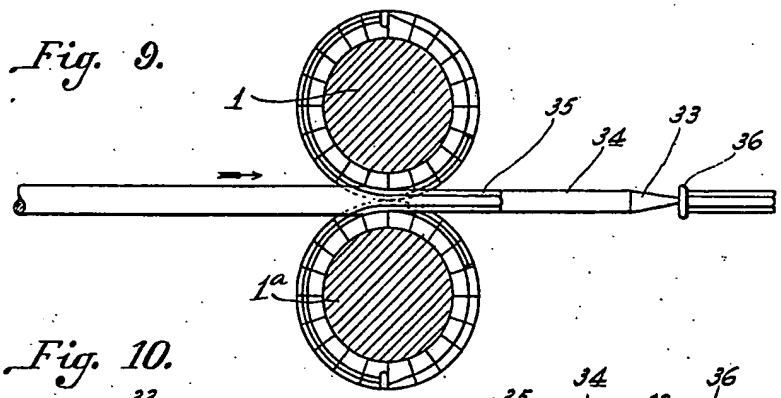
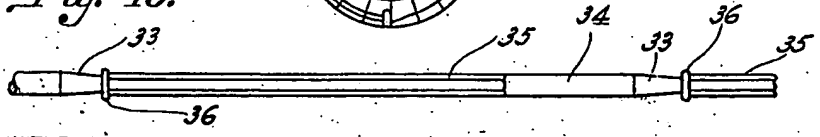


Fig. 10.



WITNESSES

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